CLAIMS

WHAT IS CLAIMED:

1. A method of depositing a metal over a substrate including a dielectric layer having a patterned region and a substantially non-patterned region formed therein, the method comprising:

exposing said substrate to an electrolyte bath so as to non-conformally deposit metal in a bottom-to-top technique in said patterned region;

forming an excess metal layer over said patterned region and said substantially non-patterned region; and

controlling at least one process parameter during the formation of said excess metal layer to adjust a surface roughness of said excess metal layer.

2. The method of claim 1, wherein said excess metal layer is formed in said electrolyte bath and said at least one process parameter represents the concentration of a leveler affecting the surface quality of a metal layer formed in said electrolyte bath.

3. The method of claim 1, wherein said electrolyte bath is a bath configured for electroplating.

4. The method of claim 1, further comprising removing said excess metal layer by chemical mechanical polishing using an endpoint detection signal.

5. The method of claim 4, further comprising:

exposing a second substrate that is substantially identical to said substrate to said electrolyte bath so as to non-conformally deposit metal in a bottom-to-top technique in said patterned region;

forming an excess metal layer over said patterned region and a substantially non-patterned region of said second substrate; and

based on said endpoint detection signal, controlling at least one process parameter during the formation of said excess metal layer of said second substrate to adjust a surface roughness of said excess metal layer of said second substrate.

6. The method of claim 5, wherein a steepness of a slope of said endpoint detection signal is used for controlling said at least one process parameter.

7. The method of claim 1, wherein said metal comprises copper.

8. The method of claim 1, wherein said patterned region includes vias having a diameter of approximately 0.1 μm or less.

9. The method of claim 1, wherein a surface roughness above said patterned region and a surface roughness above said substantially non-patterned region are approximately equal.

10. A method of forming a metallization layer of a semiconductor device, the method comprising:

providing a substrate having formed thereon a dielectric layer with a first region and a second region, said first region including vias and trenches to be filled with a metal, said second region being substantially devoid of trenches and vias to be filled with metal;

exposing said substrate to an electrolyte bath to fill said vias and trenches in said first region and to form an excess metal layer over said first and second regions, wherein a surface roughness at least of said second region is adjusted to be higher than approximately 50 nm; and

removing said excess metal layer by chemical mechanical polishing, wherein said surface roughness of said metal layer above at least said second region promotes the removal of said excess metal layer above at least said second region during said chemical mechanical polishing process.

11. The method of claim 10, further comprising generating an endpoint detection signal during said chemical mechanical polishing of said substrate and stopping said chemical mechanical polishing on the basis of said endpoint detection signal.

12. The method of claim 10, wherein said surface roughness is adjusted by controlling at least one process parameter during the exposure of said substrate to the electrolyte bath.

13. The method of claim 12, wherein said at least one process parameter represents the concentration of a leveler affecting the surface quality of a metal layer formed in said electrolyte bath.

14. The method of claim 11 and 12, further comprising establishing a relation between said surface roughness and said endpoint detection signal.

15. The method of claim 14, wherein said relation is determined by a slope of said endpoint detection signal.

16. The method of claim 14, further comprising processing a second substrate that is substantially identical to said substrate by exposing said second substrate to said electrolyte bath, wherein a surface roughness of a second region of said second substrate is adjusted on the basis of said relation between said surface roughness and said endpoint detection signal.

17. The method of claim 10, further comprising forming a barrier layer and a seed layer prior to exposing said substrate to said electrolyte bath.

18. The method of claim 17, further comprising forming a pattern in said barrier layer and said seed layer in said second region to adjust said surface roughness in said second region during exposure to said electrolyte bath.

19. A method, comprising:

determining a surface roughness of a metal layer formed over a dielectric including a patterned region and a substantially non-patterned region;

removing a portion of said metal layer by chemical mechanical polishing to expose said dielectric in said patterned and non-patterned regions;

monitoring an endpoint detection signal during said chemical mechanical polishing; and

relating said monitored endpoint detection signal to said determined surface roughness to determine an optimum surface roughness for a desired signal/noise ratio of said endpoint detection signal.

20. A method, comprising:

determining a surface roughness of a metal layer formed over a dielectric including a patterned region and a substantially non-patterned region;

removing a portion of said metal layer by chemical mechanical polishing to expose said dielectric in said patterned and non-patterned regions;

monitoring a polishing time for substantially completely clearing said patterned and non-patterned regions; and

relating said monitored polishing time to said determined surface roughness to determine a surface roughness that results in a reduced polishing time.